

At page 3, line 8 – page 4, line 2:

Al -- The present invention is directed to a garment having one or more garment openings for the wearer's waist, legs, ankles, arms, wrists, neck, and the like. For example, the garment may be a diaper, training pant, feminine hygiene article, swimwear, absorbent underpant, medical gown, medical cap, medical glove, medical drape, medical face mask, or the like. The garment has elasticized gasket-like openings that provide superior leakage protection against matter either leaving or entering the garment. Furthermore, the garment can be produced without the use of a separately manufactured, separately attached elastic band, and is easier and less expensive to manufacture than a conventional garment having one or more elastic bands at the opening.

sub B1 The garment of the invention is manufactured using a targeted elastic material ("TEM") having a targeted elastic zone aligned with the garment opening or openings. The TEM may have a substantially homogeneous appearance, and does not have a separately manufactured elastic band attached to it. Yet the TEM has different elastic properties at different regions, and exhibits greater elastic tension and/or greater elongation in a region aligned with, and in the vicinity of, at least one garment opening. In one embodiment, for example, the TEM may include one or more high tension zones defining a fluid sealing gasket at the garment opening, and one or more low tension zones away from the opening. The high tension zone(s) can include one set of elastomeric filaments while the low tension zone(s) can include a different set of elastomeric filaments. The elastomeric filaments in the high tension zone may have different average filament sizes and/or filament densities than the elastomeric filaments in the low tension zone. In another embodiment, the TEM may include one or more low stretch zones defining a fluid sealing gasket, and one or more low stretch zones away from the gasket. The fluid sealing gasket can interface with a body part during use to resist fluid transfer across the gasket.

The TEM is suitably a laminate including at least one facing layer, or the TEM may have two facing layers. The TEM may also include a barrier film that is liquid impermeable and gas permeable, as a further measure of sealing fluid within

al the garment while allowing moisture vapor to escape. The barrier film may be positioned between two or more elastomeric filaments. *aa*

At page 4, line 14 – page 6, line 2:

aa Fig. 1 illustrates a perspective view of a pant-like absorbent garment in accordance with the invention, having targeted elastic gasket regions aligned with, and in the vicinity of garment openings;

Fig. 2 is a plan view of the garment shown in Fig. 1, showing the side facing away from the wearer;

Fig. 3 is a plan view of the garment shown in Fig. 1, showing the side facing the wearer when the article is worn, and with portions cut away to show the underlying features;

BO Figs. 4-7 illustrate representative targeted elastic laminate (“TEL”) materials useful for making the garments of the invention;

Figs. 8-11 illustrate representative processes for making TEL materials useful for making garments of the invention;

Fig. 12A shows one exemplary adhesive spray pattern in which the adhesive has been applied to the elastic filaments with attenuation in the cross direction;

Fig. 12B shows a second exemplary adhesive spray pattern;

Fig. 12C illustrates a third exemplary adhesive spray pattern;

Fig. 12D shows an exemplary bond angle in one exemplary adhesive spray pattern;

Fig. 13 illustrates the bonding pattern and method of calculating the number of bonds per unit length on elastic strands or filaments;

Fig. 14A shows a fourth exemplary adhesive spray pattern in a swirled-type of configuration;

Fig. 14B shows a fifth exemplary adhesive spray pattern that is more randomized and which provides a large percentage of adhesive lines in a perpendicular orientation to the elastic filaments;

Fig. 14C illustrates a sixth exemplary adhesive spray pattern having attenuation of adhesive lines in the cross-machine direction;

Fig. 14D shows a seventh exemplary adhesive spray pattern that resembles a "chain-link fence"; and

Fig. 15 is a schematic view of another process for making TEL materials useful for making garments of the invention.

At page 27, line 15 – page 28, line 7:

In TEL 100, low tension and/or high stretch zone 102 may have a first elastic tension, measured at 50% elongation of the filaments, and high tension and/or low stretch zone 104 may have a second elastic tension higher than the first tension, measured at the same elongation. At 50% elongation of the TEL 100 (in the machine direction, parallel to filament orientation), high tension and/or low stretch zone 104 may have an elastic tension at least 10% greater, suitably at least 50% greater, desirably 100-800% greater, alternatively about 125-500% greater, or as another alternative about 150-300% greater than the low tension and/or high stretch zone 102. Elastic tension may be measured, for instance, using an MTS SINTEC Model 1/s, sold by MTS in Research Triangle Park, North Carolina, with a crosshead speed set to 500 mm/min. Samples having a 3-inch width and 6-inch length can be used, with 3 inches of the length clamped inside the jaws (leaving 3 inches of length for testing). The tension of each high and low tension region can be measured after the portion of the TEL laminate being tested is held in the extended condition (in the machine direction of the TEL) for 60 seconds.

At page 29, line 20 – page 30, line 10:

Materials suitable for use in preparing elastomeric filaments 108 and 109 in the low and high tension and/or stretch zones 102 and 104 include diblock, triblock, tetrablock or other multi-block elastomeric copolymers such as olefinic copolymers, including styrene-isoprene-styrene, styrene-butadiene-styrene, styrene-ethylene/ butylene-styrene, or styrene-ethylene/propylene-styrene, which may be obtained from the Shell Chemical Company, under the trade designation KRATON

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elastomeric resin; polyurethanes, including those available from E. I. Du Pont de Nemours Co., under the trade name LYCRA polyurethane; polyamides, including polyether block amides available from Ato Chemical Company, under the trade name PEBAX polyether block amide; polyesters, such as those available from E. I. Du Pont de Nemours Co., under the trade name HYTREL polyester; and single-site or metallocene-catalyzed polyolefins having density less than about 0.89 grams/cc, available from Dow Chemical Co. under the trade name AFFINITY. ✓

(At page 30, line 21 – page 31, line 4:)

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✓ Suitable block copolymers useful in this invention include at least two substantially polystyrene endblock portions and at least one substantially ethylene/butylene mid-block portion. A commercially available example of such a linear block copolymer is available from the Shell Chemical Company under the trade designation KRATON G1657 elastomeric resin. Another suitable elastomer is KRATON G2740. ✓

(At page 31, line 17 – page 32, line 7:)

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✓ Commercial production of single-site catalyzed polymers is somewhat limited but growing. Such polymers are available from Exxon Chemical Company of Baytown, Texas under the trade name EXXPOL for polypropylene based polymers and EXACT for polyethylene based polymers. Dow Chemical Company of Midland, Michigan has polymers commercially available under the name ENGAGE. These materials are believed to be produced using non-stereo selective single-site catalysts. Exxon generally refers to their single-site catalyst technology as metallocene catalysts, while Dow refers to theirs as “constrained geometry” catalysts under the name INSITE to distinguish them from traditional Ziegler-Natta catalysts which have multiple reaction sites. Other manufacturers such as Fina Oil, BASF, Amoco, Hoechst and Mobil are active in this area and it is believed that the availability of polymers produced according to this technology will grow substantially in the next decade. ✓

At page 35, line 12 – page 36, line 2:

67 After first and second filaments 212 and 216 are stretched, elastic nonwoven web 206 is laminated to a first facing material 218 and (alternatively) a second facing material 220. First facing material 218 is unwound from one of the rollers 262 and laminated to a first side of nonwoven web 206. Second facing material 220 is unwound from one of the rollers 264 and laminated to a second side of nonwoven web 206. As shown in Fig. 8, before second facing material 220 is laminated to a second side of elastic nonwoven web 206, at least a portion of second facing material 220 can be coated or sprayed with an elastomeric adhesive 221, such as Findley H2525A, H2525 or H2096, via an adhesive sprayer 265. Representative adhesive patterns are illustrated in Figs. 12A-14D. The laminate material is then passed through nip rolls 270 (desirably smooth or patterned calender rolls) and is relaxed and/or retracted to produce a TEL 205. Other means for bonding the laminate material known to those having ordinary skill in the art may be used in place of nip roll 270.

At page 37, line 3 – page 38, line 8:

68 Fig. 15 illustrates a VF SBL process in which no stretch rolls 254 are used. Instead, first filaments 212 are extruded onto chill roll 246. Second filaments 216 are extruded onto chill roll 245, where the first filaments 212 and second filaments 216 converge to form a single elastic nonwoven layer 206 having zones of higher and lower elastic tensions. The first and second filaments 212, 216 are stretched between the chill rolls 245, 246 and the nip rolls 270. Except for the lack of stretch rolls 254, the processes of Figs. 8 and 15 are similar. In either case, the elastic nonwoven layer 206 is laminated between a first facing layer 218 and a second facing layer 220 at the nip rolls 270. The resulting laminate is then relaxed and/or retracted to form TEL 205.

Fig. 10 illustrates a continuous horizontal filament stretch-bond laminate (CF SBL) process 300 for making TEL materials. A first extrusion apparatus 330 (which can be a spinnerette, as described above) is fed with an elastomeric polymer or polymer blend using one or more extruders (not shown). In

38 various embodiments, the extrusion apparatus 330 can be configured to form a nonwoven layer 306 having zones of higher and lower elastic tension and/or stretch, as illustrated in Figs. 4-7. In another embodiment, the extrusion apparatus 330 can be configured with die holes of uniform size and spacing, to yield a nonwoven layer 306 which has uniform elastic tension and/or stretch across its width. The nonwoven layer 306 contains filaments 312 which are substantially continuous in length. In this regard, the extrusion apparatus 330 may be a spinnerette. Suitably, apparatus 330 is a meltblowing spinnerette operating without the heated gas (e.g., air) stream which flows past the die tip in a conventional meltblowing process. Apparatus 330 extrudes filaments 312 directly onto a conveyor system, which can be a forming wire system 340 (i.e., a foraminous belt) moving clockwise about rollers 342, 344. Filaments 312 may be cooled using vacuum suction applied through the forming wire system, and/or cooling fans (not shown). The vacuum may also assist in holding nonwoven layer 306 against the forming wire system. ~

At page 39, line 21 – page 41, line 2:

39 ~ Then, if it is desired to convert the TEL 305 into a stretch-bonded laminate, the TEL 305 may be stretched in a stretching stage 354 by pulling it between two nip rolls 356 and 358 which turn at a higher surface speed than the conveyor 340. At the same time, the facing layers 360 and 362 can be unwound from supply rollers 364 and 366, and laminated to the TEL 305 using the stretch roll assembly. To accomplish this dual purpose, the nip rolls 356 and 358 may be smooth or patterned calender rolls which use pressure to bond the materials 360, 305 and 362 together as well as stretch the TEL 305. Alternatively, both heat and pressure may be applied to bond the materials 360, 305 and 362 together. The resulting stretch-bonded laminate 370 may then be relaxed and/or retracted using nip rollers 372 and 374 that rotate at lower surface speed than calender rolls 358, and may be wound onto storage roll 376. The facing layers 360 and 362 may be any of the facing materials described above, and are suitably polyolefin-based spunbond webs.

Fig. 11 illustrates a hybrid 300 of a CF SBL process and a VF SBL process for making a stretch-bonded TEL 370. A first extrusion apparatus 330 is fed

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with an elastic polymer or polymer blend from one or more sources (not shown). Extrusion apparatus 330 may be any of the various devices described with respect to Fig. 10. Desirably, apparatus 330 is a meltblowing spinnerette operating without the heated gas (e.g., air) stream which flows past the die tip in conventional meltblowing processes. Apparatus 330 extrudes lower tension and/or higher stretch filaments 312 directly onto a conveyor system, which can be a forming wire system 340 (i.e., a foraminous belt) moving clockwise about rollers 342, 344. Filaments 312 may be cooled using vacuum suction applied through the forming wire system, and/or cooling fans (not shown). The vacuum may also help hold the filaments against the forming wire system. M

(At page 43, line 2 – page 44, line 8:)

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M The following procedure is described for testing of the water vapor transmission rate (WVTR) for the breathable barrier films used in the invention. The WVTR is measured in a manner similar to ASTM Standard Test Method for Water Vapor Transmission of Materials, Designation E-96-80 as follows. For the purposes of the present invention, 3 inch diameter (76 mm) circular samples are cut from the test material and from a control material, CELGARD 2500 (Hoechst Celanese Corporation). CELGARD 2500 is a 0.0025 cm thick film composed of microporous polypropylene. Two or three samples are prepared for each material. Test cups used for testing are cast aluminum, flanged, 5.1 centimeters deep and come with a mechanical seal and neoprene gasket. The cups are distributed by Thwing-Albert Instrument Company, Philadelphia, Pennsylvania, under the designation Vapometer cup no. 68-1. One hundred millimeters of distilled water is poured into each Vapometer cup, and each of the individual samples of the test materials and control material are placed across the top area of an individual cup. Screw-on flanges are tightened to form a seal along the edges of the cups leaving the associated test material or control material exposed to the ambient atmosphere over a 62 millimeter diameter circular area (an open, exposed area of about 30 cm²). The cups are then weighed, placed on a tray, and set in a forced air oven set at 100 F (38 C). The oven is a constant temperature oven with external air through it to prevent water vapor